Management of a Skeletal Class Iii, in A Patient with Mixed Dentition Phase one, with A Hyrax Breaker and A Petit Mask: A Case Report

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Abstract
Class III is a complex intervention malocclusion, there are different treatment options related to the patient's growth potential, always starting with the correction of the transverse plane to stimulate the sutural complex of the maxilla and favor advancement with the use of a surgical mask. protraction. Objective: To assess the evolution of skeletal class III treatment with the Petit and Hyrax mask. Materials and Methods: Case report of a female patient with a diagnosis of bimaxillary skeletal class III. Results: The growth of the anterior part of the maxilla, premaxilla and frontal process was improved, modification of the direction of mandibular growth, this is reflected in satisfactory facial changes. Conclusion: The treatment objectives are met, improving the patient's quality of life by establishing a natural balance.
Keywords: Class III, Facial Mask, Petit Mask, Class III Management, Early - Late Treatment

1. Introduction

Class III malocclusion is a type of dental and facial abnormality that has a variety of causes, including excessive growth of the jaw, a shortage of the upper jaw, or a combination of both. It can be seen in isolation or as part of a larger syndrome, and its frequency differs across populations worldwide. This condition often presents early in life, and it is typically diagnosed by the presence of an incisal relationship where the front teeth meet in an edge-to-edge position or by a history of a previous crossbite. (1).
Studies show that mask therapy and rapid maxillary expansion is an effective method for treatment and although early intervention may provide a better orthopedic response, treatment at the end of mixed or early permanent dentition can produce positive results. Therapeutic management is complex, as growth is considered unfavorable and difficult to predict, so recurrence is usually common. (2,3)
Among the various types of face mask available, Petit's model is a mask that reduces the time of care and is also the best accepted by patients for being a simpler model. These characteristics allow its use in most Class III patients in early mixed dentition or late deciduous dentition with a good prognosis (1).
Rodriguez et al. indicate that the combination of the protraction mask with the Hyrax circuit breaker is an effective early treatment option especially in children 5 to 9 years of age, with a class III for maxillary hypoplasia.
According to several authors, the facial mask method in combination with Hyrax proved to be effective not only in maxillary advancement but also in expansion, also in the change of profile and therefore with skeletal effect, since the palatine sutures have a greater capacity to respond to treatment while performing at the stage of adequate bone maturation, These results are maintained in the long term.
The objective of this publication is to assess the evolution of treatment in a patient in mixed dentition with bimaxillary Class III malocclusion, treated with expansion and Petit protraction mask.

2. Materials and Methods

Description Ofthe Case

A 7-year-old female patient comes to the consultation for a dental check-up.
Clinical examination revealed a concave profile, stage 1 mixed dentition, left Class III and right Class

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I molar ratio, overjet -2mm, atresia of the upper and lower dental arch with primary crowding. (Figure 1, Figure 2)

The cephalometric conclusions were:

1. Bimaxillary Class III skeletal relationship
2. Clockwise growth
3. Vestibularized upper incisors
4. Vestibularized and protruded lower incisors (Figure 3, Figure 4, Table 1).

The treatment is started with a Hyrax Circuit Breaker with acrylic tracks with hooks welded at the level of canines, rapid disjunction occurs in a period of 7 days with activation frequency of 1/4 back in the morning 1/4 back at night on a daily basis with the purpose of achieving the separation of the circummaxillary sutures which favors protraction with the mask.

After this week of activation, Petit's previous poster traction mask was placed, with the aim of correcting the sagittal anomaly; the procedure consists of the application of a heavy extra oral force of 500gr per side, the applied force must be controlled by a dynamometer between the hook placed to the Hyrax circuit breaker, fixed to the upper teeth and the traction mask, the orientation of the traction must be forward and slightly down, the level of the traction application is located below the occlusal plane, to avoid the upper rotation of the maxilla and as a consequence an open bite. The chin guard of the mask should not press point B to prevent reabsorption of the anterior alveolar process; The traction mask was used throughout the night and a few hours during the day.

After the active phase, the circuit breaker remained passive in the oral cavity for 5 months, while the sutural reorganization of the upper jaw is processed and the maxilla is pulled to the desired position.

Once the circuit breaker was removed, active plates were placed to continue with the stimulation of maxillary and mandibular growth in a transverse direction, with a slow expansion.

Clinically, there were favorable changes in the harmonization of the lip profile, improvement of the upper labial posture and tip of the nose; in radiographic changes are obtained: Class I skeletal ratio, increased mandibular length, advance of point A, significant change in SNA, ANB, ANB and Witts. (Figure 5, Figure 6, Figure 7, Figure 8, Table 2)

The rapid maxillary disjunction allows a maxillary expansion in a transverse direction, also increasing the length of the arch improving the eruption pattern of the dental organs 1.3 and 2.3,

The growth of the anterior part of the maxilla, premaxilla and frontal process was improved, modification of the direction of mandibular growth this is reflected in the satisfactory facial changes that allowed to improve the quality of life of the patient establishing a natural balance and decreasing the possibility of recurrence.

It is important to emphasize that to obtain the results it is necessary to be rigorous with the protocol for the use of the traction mask, the use of heavy forces, as well as its orientation, direction and adequate adaptation to the patient's face.

Overcorrection in this type of anomalies is necessary, as well as the retention period while the neoformation process occurs.

Figure 1. Early extraoral photographic records
Source: Villacís, Salame, López; 2022

Figure 2. Initial intraoral photographic records
Source: Villacís, Salame, López; 2022

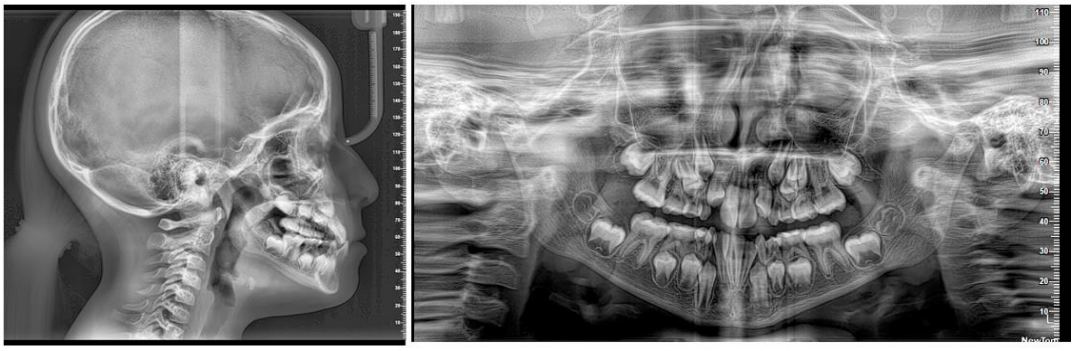


Figure 3. Initial radiographic records.
Source: Villacís, Salame, López; 2022

Table 1. Initial cephalometric values Figure 4. Initial layout		
Factor	Average value	Initial
IN THE	82 +-2	84
SNB	80 +-2	83
ANB	2+-1	1
Mandibular plane angle	32+-4	35
Wits	-1.0 +-1.0	-6.8
Protrusion labio superior	0.0 +- 1.0	-0.6
Lower lip protrusion	0.0 +-1.0	0.7
Interincisive Angle	131 +- 6	139
Angulo IS	22 +- 2	20
Angulo II	25 +- 2	21
Chair angle	122+-5	121
Joint Angle	143+-6	143
Goniaco Angle	130+-7	133
Branch Height	44,2 +-5	34,1
Mandibular body	71,2 +-5	59.7

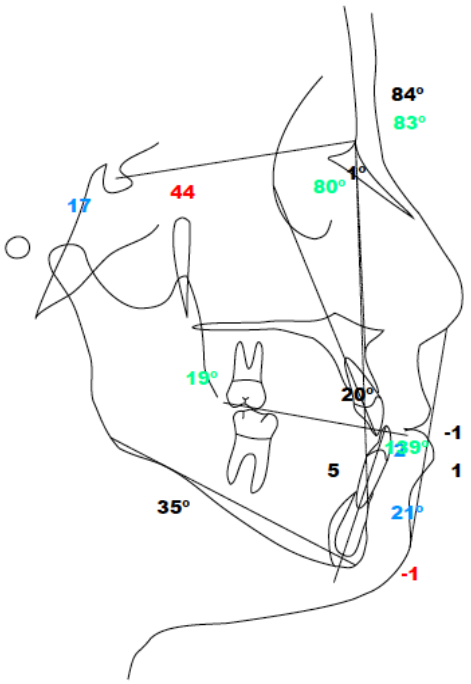


Figure 5 Final extraoral photographic records
Source: Villacís, Salame, López; 2022 Source: Villacís, Salame, López; 202

Figure 6 Final intraoral photographic records
Source: Villacís, Salame, López; 2022

Figure 7 Final Radiographic Records
Source: Villacís, Salame, López; 2022

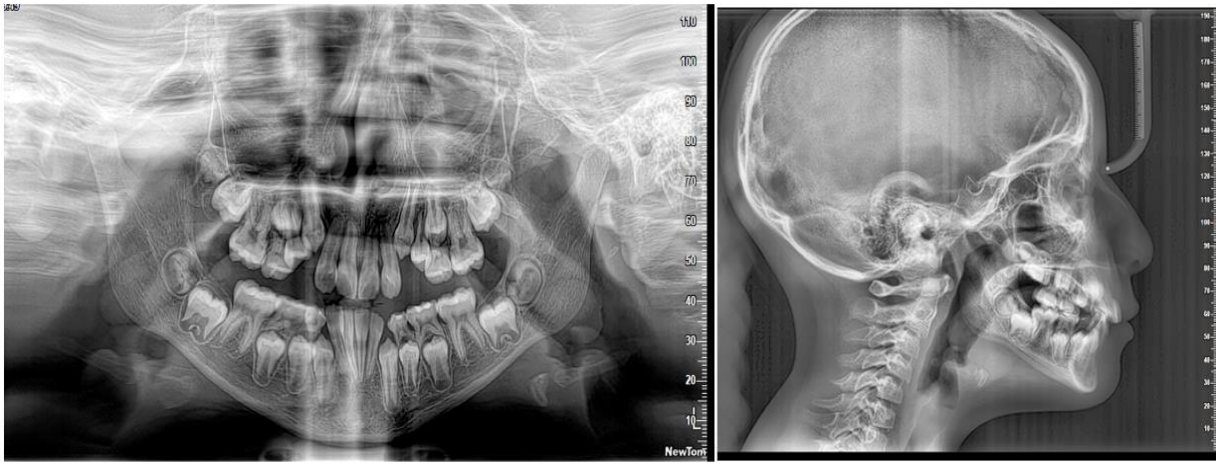
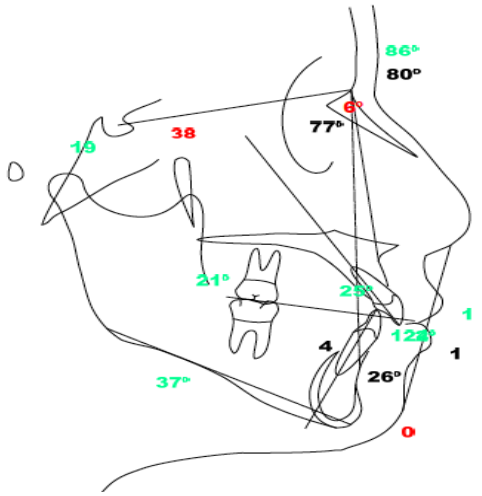


Figura 6. End-of-the-art Radiographic Records
Source: Villacís, Salame, López; 2022

Table 2. Initial and final cephalometric values. Figure 8. Final path			
FACTOR	AVERAGE VALUE	INITIAL	FINAL
IN THE	82 +-2	84	86
SNB	80 +-2	83	80
ANB	2+-1	1	6
Mandibular plane angle	32+-4	35	37
Wits	-1.0 +-1.0	-6.8	-1.1
Upper lip protrusion	0.0 +- 1.0	-0.6	1.2
Lower lip protrusion	0.0 +-1.0	0.7	1.0
Interincisive Angle	131 +- 6	139	124
Angulo IS	22 +- 2	20	25
Angulo II	25 +- 2	21	26
Chair angle	122+-5	121	127
Joint Angle	143+-6	143	139
Goniaco Angle	130+-7	133	132
Branch Height	44,2 +-5	34,1	36.8
Mandibular body	71,2 +-5	59.7	60.7



Source: Villacís, Salame, López; 2022 Source: Villacís, Salame, López; 2022

3. Discussion

Scientific evidence provides a series of therapeutic options that could be used according to the clinical characteristics of each patient, Rodríguez et al. (4) point out that the combination of the facial mask with the Hyrax circuit breaker is a very effective early treatment option especially in early interventions, with a class III due to the maxilla. According to Baccetti (1998) and Kim (1999), better results are obtained when facial mask treatment occurs in early mixed dentition compared to the same treatment performed at the end of mixed dentition (5,6).

Rapid maxillary expansion in combination with maxillary protraction remains solidly substantiated with relatively stable results, regardless of the presence of crossbite. Orthopedic disjunction of the sutures facilitates protraction with normal growth of the upper jaw, which has a downward and forward displacement (4). The clinical importance of protraction face mask therapy is skeletal modifications induced by primary forward displacement of the upper jaw, backward movement of the mandible, clockwise rotation of the mandibular plane, and counterclockwise rotation of the maxillary plane. Taking into account that the effects of the pull mask are enhanced by the previous rapid maxillary expansion (7).

In the patient, an improvement in the facial profile was evidenced more and an adequate overjet and overbite was achieved in relation to the records initially taken. Changes in soft tissue result from treatment-induced underlying skeletal movement, especially in the labial position and tip of the nose. As for the cephalometric changes of observe significant changes in the Witts, SNA, SNB, ANB that evidences the success of the applied therapy, however some authors indicate that the long-term results are difficult to determine and there is also controversy in that the changes of the cephalometic measures that have their reference in cranial structures, They could be due to the patient's own growth.

Santiner Pal et al (5) argue that another type of early treatment of class III is the use of chin guard especially for patients who have a hyperdivergent growth and have a class III because of the jaw. The chin guard helps to redirect mandibular growth in both the sagittal and vertical planes. In their study it is concluded that the correction of class III is achieved, in addition to the improvement of the profile and molar and canine class I, however, these results can be lost when the patient enters the stage of puberty.

On the other hand, Mousoulea Sophia et al (8) point out that treatment with chin guard should be considered as a short-term treatment especially in patients who are in the growth stage, also in this study it is concluded that without taking into account the disadvantage of time the chin guard helps to significantly reduce mandibular length. So it would be recommended that, once the chin treatment is finished, do not completely remove the device but continue using it as a containment in order to maintain the results obtained for longer. This last aspect needs more studies to corroborate its long-term effectiveness(13,14,15).

It must be taken into account that the large number of variables that influence not only the diagnosis but also the choice of time and treatment plan, are an

important limitation that is related to the results of the study. Variables such as the age of the patient, sex, economic situation, the degree of collaboration that will be reflected in the time of use of the devices, that the patient complies with the indications delivered, that he attends all control appointments, etc; They are factors that will determine differences in the results, in this case the treatment objectives were met and it is taken into account that the retention will be maintained until the patient completes his stage of bone maturity(16,17,18).

The management of skeletal Class III malocclusions in patients with mixed dentition phase one requires careful consideration of several factors, including growth patterns, dental development, and patient preferences. In this context, a multidisciplinary approach that involves the collaboration of orthodontists, pediatric dentists, and oral surgeons is crucial for achieving successful outcomes. Additionally, the use of innovative techniques and technologies, such as Neutrosophic Correlation Coefficients and Neutrosophic Linguistic Scales, can provide valuable insights into treatment planning and decision-making. However, it is also essential to address broader societal issues, such as food sovereignty, that can impact the overall health and well-being of patients. By utilizing a Neutrosophic Soft Set analysis, healthcare providers can identify and address these obstacles and promote sustainable solutions that benefit both individuals and communities(19-22).

Regenerate response

4. Conclusion

Se presented favorable changes such as harmonization of the lip profile, improvement of the upper labial posture and tip of the nose; in the radiographic changes it is obtained: Class I skeletal ratio, increased mandibular length, advance of point A, significant change in SNA, ANB, ANB and Witts; which shows that the management of class III with Hyrax circuit breaker and Petit Mask, is effective, allowing to achieve the treatment objectives and improving the quality of life of the patient.

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